

ON EVAPORATION FROM A CIRCULAR SURFACE OF A LIQUID.

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In literature on evaporation the opinion is often expressed or assumed as axiomatic that evaporation from a circular surface is proportional to the area, i. e., to the square of the radius of the surface. Stefan, however, showed that theoretically evaporation by diffusion into a quiescent atmosphere would be proportional to the

first power of the radius. Miss Thomas and A. Ferguson [Abs. 71 (1918)] found experimentally that the power of the radius which was necessary to produce the observed results was between 1 and 2. In a dark, very quiet room the power was 1.4; in a lighted room it was 1.5 to 1.6; in the open air it was 1.65.

The author by a mathematical treatment of the diffusion of vapor into a flowing gas, finds that evaporation should be proportional to the $5/3d$ power of the radius. This agrees with the value found by Thomas and Ferguson for the open air.—R. C.

CULTIVATION DOES NOT INCREASE THE RAINFALL.¹

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SYNOPSIS.—Cultivation does not increase the rainfall in the semi-arid region. There are well-defined sequences of increasing and decreasing annual rainfall amounts, but there has been no progressive increase or decrease during the past 50 years.

It is not possible to predict the approximate precipitation for any year from past records.

INTRODUCTION.

The land in the Great Plains States is easily cultivated and is naturally very fertile. Wherever sufficient moisture is available, either from rainfall or by irrigation, large crops are possible.

In eastern Texas, Oklahoma, and Kansas, and in southeastern Nebraska, the average annual rainfall is over 30 inches, and it is so well distributed that serious droughts are not of frequent occurrence.

In eastern New Mexico, Colorado, and Wyoming, extreme western Texas, Oklahoma, and Kansas, western Nebraska and South Dakota, central and western North Dakota, and eastern Montana, the average annual rainfall is between 10 and 20 inches and droughts are frequent. In the years of light rainfall, or poor distribution, there is not sufficient moisture for crops unless irrigation is possible. Even in the region where the annual rainfall averages between 20 and 25 inches, crops suffer in the years of light or poorly distributed rainfall. This is particularly true in the southern portion of the Great Plains where the summer temperature is high and evaporation is, consequently, greater than in the northern part. The 20-inch average annual rainfall line follows roughly the 100th meridian of longitude, being considerably west of it in Texas and Oklahoma, slightly west in Kansas and Nebraska, slightly east in South Dakota, and considerably east in North Dakota, as is shown in figure 1.

As a well-distributed rainfall of about 20 inches each year is necessary for crops, unless irrigated, it follows that the western Great Plains is a rather critical region for growing general farm crops. Even when the so-called dry-farming practice is resorted to, crop failures are not unknown.

Years of abundant and well-distributed rainfall encourage a western extension of the cultivated area, and when there is a succession of favorable years farm operations may be pushed so far into the semiarid districts that in ordinary years the rainfall is entirely insufficient for crop needs, and disaster results. During these periods of unusual rainfall, the opinion is frequently expressed that the rainfall is increasing and that this increase must be due to the enlargement of the areas of cultivation.

Disregarding the arguments which might be presented to show that the effect of cultivation in the semiarid region must be negligible in causing the variation in

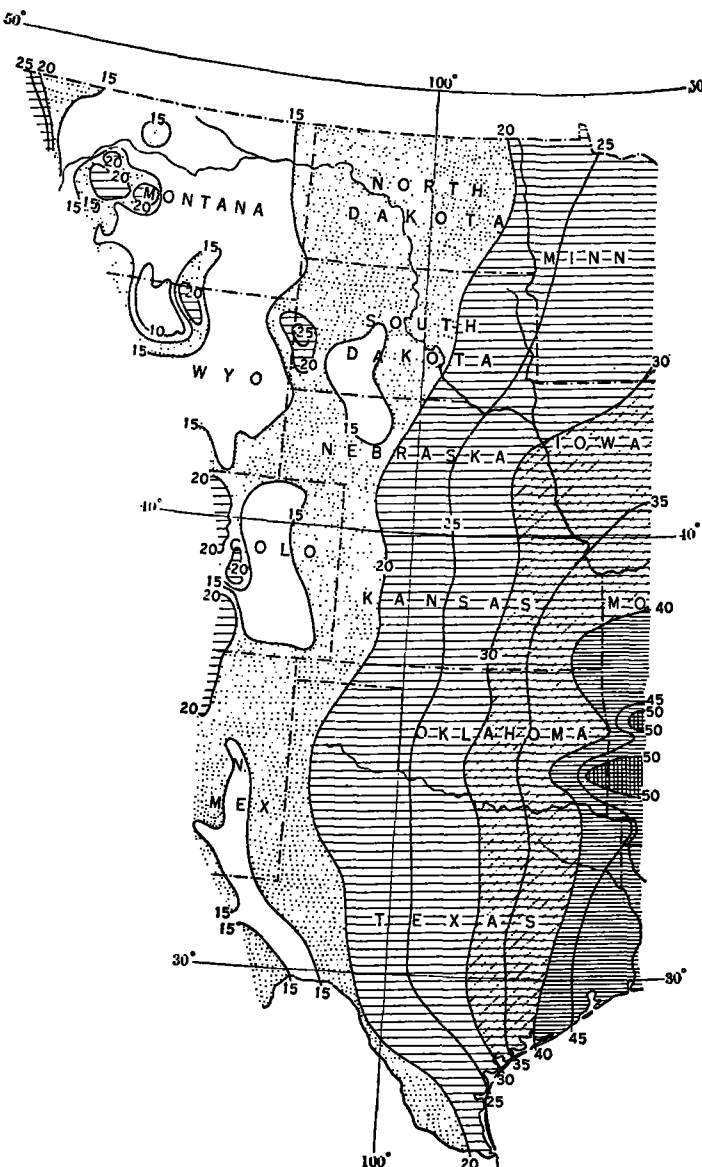


FIG. 1.—Map showing the average annual precipitation in that part of the United States lying between the 93d and the 113th parallels of longitude. (From advance folio, Atlas of Am. Agric.)

temperature and humidity necessary to produce an increase in the amount of rainfall, we have turned our

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